

WHAT IS CLAIMED IS:

1. A method for decoding Low Density Parity Check (LDPC) codes, the method comprising:

- 5        executing a sum product algorithm to recover a set of information bits from an LDPC code represented as a bipartite graph of symbol nodes and check nodes, the sum product algorithm being responsive to input log likelihood ratios associated with the symbol nodes;
- generating a set of forward difference metrics and a set of backward difference metrics in dependence on the ratios of logarithmic probabilities each associated with a corresponding
- 10        symbol node of the LDPC code,
- updating each metric in the set of forward difference metrics in dependence on the absolute value of the log likelihood ratio associated with the symbol node and the absolute value of the previous metric in the set,
- updating each metric in the set of backward difference metrics in dependence on the
- 15        absolute value of the log likelihood ratio associated with the symbol node and the absolute value of the previous metric in the set, and
- generating log likelihood ratios to be propagated back to each symbol node in dependence on the updated sets of forward and backward difference metrics.

- 20        2. A method as claimed in claim 1, wherein updating of the sets of forward and backward metrics further comprises adding a correction factor to each updated difference metrics.

3. Apparatus for decoding Low Density Parity Check (LDPC) codes, the apparatus
- 25        comprising recovery logic for performing the steps of a method as claimed in claim 1.

4. A data storage system, comprising:
- a data storage medium;
- a transducer for converting physical variations in the data storage medium into electrical signals;
- 30        and

an apparatus for decoding Low Density Parity Check (LDPC) codes for recovering recorded data from the electrical signals generated by the transducer, the apparatus for decoding Low Density Parity Check (LDPC) codes further comprising:

logic that executes a sum product algorithm to recover a set of information bits from an

5 LDPC code represented as a bipartite graph of symbol nodes and check nodes, the sum product algorithm being responsive to input log likelihood ratios associated with the symbol nodes;

logic that generates a set of forward difference metrics and a set of backward difference metrics in dependence on the ratios of logarithmic probabilities each associated with a corresponding symbol node of the LDPC code,

10 logic that updates each metric in the set of forward difference metrics in dependence on the absolute value of the log likelihood ratio associated with the symbol node and the absolute value of the previous metric in the set,

logic that updates each metric in the set of backward difference metrics in dependence on the absolute value of the log likelihood ratio associated with the symbol node and the absolute

15 value of the previous metric in the set, and

logic that generates log likelihood ratios to be propagated back to each symbol node in dependence on the updated sets of forward and backward difference metrics.

20 5. A data storage system as recited in claim 4 wherein the updating of the sets of forward and backward metrics further comprises adding a correction factor to each updated difference metric.

6. A communications device, comprising:

an information source for generating a set of information bits; and

25 an apparatus for decoding Low Density Parity Check (LDPC) codes for recovering information bits from the received symbols by performing the steps of:

executing a sum product algorithm to recover a set of information bits from an LDPC code represented as a bipartite graph of symbol nodes and check nodes, the sum product algorithm being responsive to input log likelihood ratios associated with the symbol nodes;

generating a set of forward difference metrics and a set of backward difference metrics in dependence on the ratios of logarithmic probabilities each associated with a corresponding symbol node of the LDPC code,

updating each metric in the set of forward difference metrics in dependence on the  
5 absolute value of the log likelihood ratio associated with the symbol node and the absolute value of the previous metric in the set,

updating each metric in the set of backward difference metrics in dependence on the absolute value of the log likelihood ratio associated with the symbol node and the absolute value of the previous metric in the set, and

10 generating log likelihood ratios to be propagated back to each symbol node in dependence on the updated sets of forward and backward difference metrics.

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7. A communication device as recited in claim 6 wherein the updating of the sets of forward and backward metrics further comprises adding a correction factor to each updated  
15 difference metric.

8. A computer program embodied on a computer readable medium, comprising:  
a code segment that executes a sum product algorithm to recover a set of information bits from an LDPC code represented as a bipartite graph of symbol nodes and check nodes, the sum  
20 product algorithm being responsive to input log likelihood ratios associated with the symbol nodes;

a code segment that generates a set of forward difference metrics and a set of backward difference metrics in dependence on the ratios of logarithmic probabilities each associated with a corresponding symbol node of the LDPC code,

25 a code segment that updates each metric in the set of forward difference metrics in dependence on the absolute value of the log likelihood ratio associated with the symbol node and the absolute value of the previous metric in the set,

a code segment that updates each metric in the set of backward difference metrics in dependence on the absolute value of the log likelihood ratio associated with the symbol node and  
30 the absolute value of the previous metric in the set, and

a code segment that generates log likelihood ratios to be propagated back to each symbol node in dependence on the updated sets of forward and backward difference metrics.

9. A computer program as recited in claim 8 wherein the code segment that updates  
5 the sets of forward and backward metrics adds a correction factor to each updated difference metric.

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